REMARKS/ARGUMENTS

Claims 56-95 remain pending in the instant application. Claims 60-64 and 84-95 are withdrawn from consideration pursuant to Examiner's restriction requirement and Applicant's election.

Amendments to the Claims/"Claim Interpretation"

The Office Action raises the objection that "to achieve the selected parameters", "the desired distribution" is broadly vague in scope . . .". The claim 56 is amended above to clarify the prescribed distributions as follows:

> "to deliver at least one of:
> a prescribed non-uniform distribution of the first fluid in the second fluid, and
> a prescribed non-uniform distribution of a ratio of the first fluid to the second fluid, by mass or by volume,
> the distribution being taken at a plurality of locations along a curvilinear path transverse to the second flow."

Claim 56 is amended to correct a minor grammatical informality by replacing "locations of areal" with "locations, areal" in the clause "wherein the fluid contactor, and one or more of the spatial locations of areal density, size, and orientation of the orifices"

The term "non-uniform distributions" is added to clarify and specify the use of multiple spatial locations, multiple areal densities, multiple orifice sizes, and/or multiple orifice orientations. Applicant respectfully notes that independent claim 56, as amended in the response of Nov. 13, 2007 to Office Action of Oct 15, 2003, uses the adjective "spatial" not "special". Applicant presumes this was a mere editorial oversight in the Office Action and does not reflect an incorrect interpretation of the claim.

The clause "in accordance with selected parameters characterizing the first and/or second fluid," has been deleted from independent claim 56.

As amended above, claim 56 distinguishes non-uniform streamwise distributions from non-uniform transverse distributions of first fluid, and also the distribution of the ratio of first fluid to second fluid, by adding the following clauses:

> "a prescribed non-uniform streamwise distribution of the first fluid in the second fluid;"
> "a prescribed non-uniform streamwise distribution of a ratio of the first fluid to the second fluid, by mass or by volume..." and

"...or streamwise along the second flow direction, respectively."

Claim 77 is amended to return the work "uniform", as used in "non-uniform spatial distribution", which was inadvertently deleted in the previous amendment to the claim.

Claims 79 and 80, and new claims 96 and 97, are amended to more particularly recite the markus group recited in the amended claim 56. New claims 96 and 97 read on the elected invention.

The foregoing amendments are fully supported throughout the original specification as filed, and no new matter has been added.

Rejection under 35 U.S.C. § 102

Claims 56-59, 73-76 and 78-83 are rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,183,240 to Döbbeling, *et al.* ("Döbbeling"). Applicant respectfully traverses the rejection.

Independent claim 1 recites an apparatus for mixing a first fluid in a second fluid, comprising, *inter alia*,

> a fluid contactor which forms a flow path for the first fluid from which the first fluid is delivered into [a] duct...
> wherein the fluid contactor, and one or more non-uniform distributions of the spatial locations, areal density, size, and orientation of the orifices are configured to deliver at least one of:
> a prescribed non-uniform transverse distribution of the first fluid in the second fluid;
> a prescribed non-uniform streamwise distribution of the first fluid in the second fluid;
> a prescribed non-uniform transverse distribution of a ratio of the first fluid to the second fluid, by mass or by volume; and
> a prescribed non-uniform streamwise distribution of a ratio of the first fluid to the second fluid, by mass or by volume,
> the non-uniform distribution being taken at a plurality of locations along a curvilinear path transverse to the second flow, or streamwise along the second flow direction, respectively.

These features are neither taught nor suggested by Döbbeling.

Döbbeling disclsoes "A burner for operating a unit for generating a hot gas consists essentially of at least two hollow partial bodies (1, 2) which are interleaved in the flow direction and whose center lines extend offset relative to one another in such a way that adjacent walls of

the partial bodies (1,2) form tangential air inlet ducts (5, 6) for the inlet flow of combustion air (7) into an internal space (8) prescribed by the partial bodies (1, 2)." See, Abstract. Applicant respectfully submits that Döbbeling does not teach or suggest distributing a first fluid (e.g., fuel) in a nonuniform distribution transverse to a second fluid (e.g., air) flow direction in a duct, nor that the ratio of first fluid to second fluid (e.g., fuel to air) transverse to the second (e.g. air) flow direction, or vice versa. Nor does Döbbeling teach or suggest how to deliver a first fluid (e.g., fuel) through multiple orifices distributed along the axial direction, into a second fluid flow (e.g., air.

In contrast to the present claims, Döbbeling does not mention "transverse" in any sense. The only use of "distribution" is in claim 15 "additional air is injected into the burner as several distinct jets in a preferably equidistant distribution around the circumference of the burner."

The Office Action states that "the orifices 34 and 19 in figure 4 are spatially disposed in a non uniform pattern." Applicant respectfully disagrees. Döbbeling discloses "The invention, is based on the object of creating an appliance which permits effective suppression of thermoacoustic vibrations and is associated with the smallest possible design complication." The reference makes no mention of "uniform", nor of "nonuniform", nor "linear", nor "nonlinear", nor "ratio", nor "stoichiometric", nor "spacing". Reference 34 of Döbbeling are not orifices, but represent air flow. In addition, Döbbeling specifically claims that the air injection jets are equidistantly, i.e., uniformly, distributed (see, claim 15). Döbbeling states "A plurality of nozzles 32 of circular cross section are arranged on the inside of the burner outlet 17. Air 34 is injected through the nozzles 32 at right angles to the flow direction 30 in a plane at right angles to the flow direction." "The flow direction of the perturbation air 34 emerging from the nozzles 32 (not shown in FIG. 4) points radially inwards in this embodiment example." Any apparent variation in spacing of nozzles 32 shown in Fig 2 is a sinusoidal variation due to the elevation projection. However, as the reference itself discloses, the orifices are, in fact, uniformly spaced.

The Office Action states "With regards to the mass flow rate volumes of flow, the flow rates provided of the 1st and 2nd flows are dependent upon the flow pressures operated by the device and does distinguish in a structural sense." However, Döbbeling's only reference to "pressure" outside the Background is simple nozzle descriptor "The fuel injection arrangement can involve an air-blast nozzle or a nozzle operating on the pressure atomization principle." Even in the Background, Döbbeling only refers to the acoustic control relevant art: "They lead to

high-amplitude pressure fluctuations, . . ." "It is similarly suitable to modulate the fuel mass flow. In this procedure, fuel is injected into the burner with a phase shift relative to measured signals in the combustion chamber (for example, relative to the pressure) so that additional heat is released at a pressure minimum. This reduces the amplitude of the pressure vibrations."

Applicant respectfully submits that Döbbeling gives no teaching or suggestion on controlling either 1st or 2nd flows, or the ratio of first to second fluid flows, other than the phase control of fuel relative to the amplitude of pressure vibrations, or generic air blast nozzles.

As illustrated above, Döbbeling does not teach or suggest delivering fluid in a non-uniform pattern to achieve a prescribed distribution in fluid mixing, as recited in independent claim 56. Claims 57-59, 73-76 and 78-83 each depend, either directly or indirectly, from independent claim 56. These dependent claims are each separately patentable, but in the interest of brevity, they are offered as patentable for at least the same reasons as their underlying independent base claims, the features of which are incorporated by reference. Therefore, Applicant respectfully submits that the rejection has been obviated, and kindly requests favorable reconsideration and withdrawal of the rejection.

Claims 56-59 and 73-83 are rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 3,734,111 to McClintock ("McClintock"). Applicant respectfully traverses the rejection.

McClintock does not mention "linear", nor "nonlinear", nor "distribution", nor "homogeneous", nor "inhomogeneous", nor "transverse", nor "concentration". The only mention of "ratio" is in the Table, Col. 3 line 58, 59, referring to the average "Steam/butane mol. ratio", and "air/butane mol. ratio". No mention is made of any control of or variation in the fluid ratio transverse to the flow in pipe 1.

The only mention of "spaced" or "spacing" is in Claim 1: "sparging pipe means perforated to emit a flow of sparged fluid at points spaced across the internal diameter of the pipe section," This provides no direction as to the spacing. The only information on orifice spacing provided by McClintock is in Example II: "the sparger pipe was extended to within two inches of the side wall of the 24 inch pipe opposite the inlet side and three-eighth inch diameter perforations on 1-1/2 inch centers were extended down both sides and around the end of the

sparger pipe to emit a flow perpendicular to the fluid flow in the pipe." i.e. equidistant spacing of orifices on 1 ½ inch centers along the sides of the sparging pipe.

The configuration of perforations is taught as: "Location of the sparger holes is on a line down each side of the sparger, and in one embodiment around the capped end, to emit sparged fluid perpendicular to the flow of fluid in the pipe section." The teaching regarding spacing on the sparger cap 5 is: "Additional fluid is sparged through the perforated cap 5 which is located within the throat of the frusto-conical baffle . . ." "The number and size of the perforations in this cap are determined by the balance of flow desired between this cap and the elongated sparger holes." Regarding perforation orientation, McClintock teaches: "Another fluid is sparged into the perforated, elongated sparger 2 to be emitted through holes 3 perpendicular to the flow of fluid in the pipe section." McClintock gives no teaching on configuring orifices in the sparging tube other than equally spaced and perpendicular to the flow.

In absence of specific teaching on spacing, the spacing of "perforations" 3 or orifices in the perforated cap 5, we consider the spacing but an artist's rendition of providing perpendicular lines of four orifices each with four additional perforations at the bisecting lines around the perforated cap. There appears to be no teaching regarding spacing on the cap 5 other than that inferred from the linear equidistant spacing of holes 3 in the sparger 2, and the apparent symmetry in orifice spacing over cap 5.

In contrast to the feartures recited in independent claim 56, McClintock provides no basis for a teaching or suggestion that the orifices 3 on pipe 2 are non-uniformly spaced. Rather, one finds explicit teaching that the orifices are on (equal) 1 ½ inch centers. Similarly, orifices 3 on cap 5 appear to be equally distribvuted in a sperical array on the cap 5, e.g., on lines at 0-180 and 90-270 degree orientations with supplementary orifices added at 45-225 degrees, and 135 – 315 degree orientations.

Therefore, Applicant respectfully submits that claim 56 as amended above and respective claims 57-59 and 73-83 are not anticipated by McClintock, as McClintock does not teach non-linear flow delivery distributions or ratios of flows along curvilinear paths transverse to the flow. Favorable reconsideration and withdrawal of the rejection is kindly requested.

Claims 56-59, 70, 72-75 and 81-83 are rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 4,273,527 to Meenan ("Meenan"). Applicant respectfully traverses the rejection.

Meenan makes no reference to "uniform" nor "nonuniform" nor "homogeneous", nor "inhomogeneous", nor "distribution", nor "transverse", nor "ratio", nor "stoichiometric", nor "composition". The only reference to "axial" is: "A first nozzle 40 is coaxial with and lies along the axis of the cylindrical combustion chamber 28."

Regarding "mix", Meenan states "Since one source of fuel used in the system 10 is pulverized material, proper mixture of gas and air throughout the length of the system 10 is necessary to insure proper combustion"; and ". . . supply tubes 20 and 22 that are connected to a source of pressurized gas such as a premix burner." Premix burners commonly seek uniform premixing. This inexorably leads one of ordinary skill in the art to understand that homogeneous and uniform mixing within the combustion chamber 28 as "necessary" "throughout the length" of system 10 according to Meenan.

Regarding orifices or "jet openings 26" and "jet openings 30", Meenan states "Around the inner periphery of each conduit 12A and 12B of the set of tubular conduits 12 are a series of jet openings 26 directed inwardly to the combustion chamber 28 to allow the passage of air into the chamber 28 along the entire length thereof. Similarly, each conduit 18A and 18B of the second set of tubular conduits 18 also includes a series of jet openings 30 extending along toward the combustion chamber 28 to allow the passage of gas from the set of tubular conduits 18 into the combustion chamber 28 along the entire longitudinal length thereof." Any variation of orifice spacing shown in Fig. 2 appears to be the projection of uniform spacing onto an elevation drawing.

As the Office Action itself admits (at p. 6), Meenan does not teach "the orifice sizes, density and placement (being non-uniform)". Applicant agrees, and respectfully submits that Meenan teaches only uniformly spaced peripheral jets oriented radially into the combustion chamber. It apparently gives no instruction on orientations other than radially oriented jets, nor any explicit description of spacing other than apparent uniform peripheral spacing in perforated cylindrical tubes uniformly spaced along the combustor. It gives no instruction on differing penetrations of jets into the flow. Meenan only shows perforated tubes peripheral to the flow, not distributed across the flow. Accordingly, Applicant respectfully submits that Meenan does

not anticipate the methods to obtain the non-uniform distributions transverse to the flow of revised Claim 56 above, and consequently of the subsequent dependent claims. Favorable reconsideration and withdrawal of the rejection is kindly requested.

With respect, the examiner's comments from "a 2nd fluid flow path for a primary fluid 7, . . . in the hemisphere 5 or cylinder 2" appear to be a duplicate of and relate to the discussion of McClintock, and do not address Meenan.

Rejections under 35 U.S.C. § 103

Claims 65-67 and 71 are rejected under 35 U.S.C. § 103(a) as obvious over Meenan in view of U.S. Patent No. 4,176,637 to Cole ("Cole"). Applicant respectfully traverses the rejection.

Claims 65-67 and 71 each depend, either directly or indirectly from independent claim 56, and incorporate its features by reference. However, Cole does not offer, nor is it alleged to, any teaching or suggestion to ameliorate the deficiencies of Meenan with respect to underlying independent base claim 56. Even presuming that Cole teaches what is attributed to it, and further that there is some apparent reason for one of ordinary skill in the art to combine the references as proposed in the Office Action, the references, taken singly or in combination, do not teach or suggest all features recited in the claims. Accordingly, Applicant respectfully submits that neither Meenan or Cole make obvious amended claim 56 above, and consequently neither dependent claims 65-67.

However turning specifically to the rejected claims, first claim 66, Cole makes no mention of "the applied high voltage is within a desired range to reduce the cross sectional area of the first fluid after it passes through said orifices without causing an arc" as recited in Claim 66. With regard to claim 67, Cole teaches "If the electrical source is AC current, a suitable rectifier circuit as described is provided to convert the AC to DC potential." Cole makes no mention of "oscillate" or "fluctuate", or "dynamic". Cole does not teach how to provide a "fluctuating voltage within a prescribed range to oscillate the delivered first fluid flow" as in claim 67.

With regard to claim 71, the flexible manifold was taught in reference to the non-elected species of Claims 63 and 64. Claim 71 is corrected form "flexible manifold" to "flexible support" to correspond to the currently elected species, to read as follows:

The apparatus of claim 56, wherein said fluid contactor comprises a flexible support ~~manifold~~ for connecting said fluid delivery system to said plurality of orifices.
(underline and strikethrough per 37 C.F.R. 1.121)

In light of the foregoing, Applicant respectfully submits that the rejection over Meenan and Cole has been obviated, and kindly requests favorable reconsideration and withdrawal.

Claims 68-69 and 76-80 are rejected under 35 U.S.C. § 103(a) as obvious over Meenan in view of Döbbeling. Applicant respectfully traverses the rejection.

Claims 68-69 and 76-80 each depend from independent claim 56, and incorporate its features by reference. As illustrated above, neither Meenan nor Döbbeling teach or suggest the features of claim 56. Their proposed combination does not ameliorate their respective deficiencies. Therefore, the references, taken singly or in combination, do not teach or suggest all features recited in the claims. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Accordingly, Applicant respectfully submits that neither Meenan nor Döbbeling make obvious amended claim 56 above, and consequently neither dependent claims 68-69 and 76-80.

Conclusion

In light of the foregoing, Applicant respectfully submits that all claims are patentable, and kindly solicits and early and favorable Notice of Allowability.

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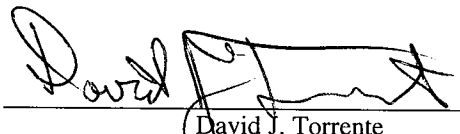
Respectfully submitted,



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